

Letter to the Editors

Adverse effects and homeopathy: may remedies yet contain noxious or toxic molecules?

Salvatore Chirumbolo

Department of Medicine, University of Verona, Verona, Italy

A recent article published in the latest issue of PLoS ONE by Csutor *et al.* assessed that, at least for a very special subgroup of homeopathic medicines, a big concern about their reliability and safety still currently exists [1]. As highlighted by these authors' work, homeopathic products may contain ingredients in allopathic doses. Low dilutions and mother tinctures still play a role in homeopathic prescribing, and are particularly prominent in certain systems of homeopathy focusing on the organotropic effects of homeopathic medicinal products [2]. This fact raises some fundamental ethical issues. In the European Union, the Directive 2001/83/EC allowed the authorization of homeopathic medicines containing allopathic doses. Therefore the distinction between low potency homeopathic medications and allopathic herbal medicines might be based on the intention of the manufacturer, i.e. on the production method and the rationale behind their application and not on the dose. I recently reported this concern in a comment of mine [3], where I tried to expand the debate on the urgent need to amend homeopathy by checking commercial preparations about their molecular content and source components before introducing them to the consumer. While people believe that homeopathic medicines in high dilutions, prescribed by trained professionals, are probably safe and unlikely to provoke severe adverse reactions, it is difficult to draw definite conclusions from the reported literature in the field, either because of the low methodological quality of reports claiming possible adverse effects [4] or because the many comments coming to an uproar due to critical controversy [5]. In my opinion, even high diluted homeopathic medicine could contain noxious components for health and I discussed this issue in ref [3]. but this should be confirmed by high tech chemical-physical analysis before rendering homeopathic remedies available on the public market. The resolution WHA56.31 on traditional medicine, adopted by the 2009 World Health Assembly, requested WHO to provide technical support for developing methodologies to ensure product quality, efficacy and safety in homeopathy. In this perspective, the evidence that the

extreme homeopathic dilutions retain starting materials was demonstrated by homeopaths themselves using TEM, electron diffraction and chemical analysis by ICP-AE spectroscopy [6]. Ultrastructural physical analysis of water-ethanol interfaces in glass containers, prompts us to make this consideration. During the high mechanical stress, which every homeopathic medicine undergoes, at the structured solid (glass)-water interfaces occurs the formation of very small gas bubbles, known as 'nanobubbles', as shown by the tapping mode atomic force microscopy (TMAFM) imaging technique. This nanobubble formation can affect significantly the role of water interaction with hydrophobic molecules, especially when ethanol is present [7]. The effect of surface treatment with alcohols on interacting hydrophobic surfaces in water has a dramatic effect on the formation of nanobubbles and thus the long range hydrophobic force. Without alcohol-water exchange the population and size of nanobubbles is reduced resulting in either a 'true' short range hydrophobic force or a long range nanobubble bridging hydrophobic force, thus changing dramatically the solvent property of water during a dilution step [7]. This might account for the non-linear dynamics observed when a serially diluted compound was checked by quantitative chemical analysis [3, 8]. On the basis of recently published results [8] nanoparticles can be concentrated on the liquid surface in a manner similar to the traditional froth-flotation process used in the metal ore purification of larger particles. Lactose during grinding helped in the formation of nanoclusters, whereas the ensuing processes such as mechanical stress and sparging producing numerous large air bubbles aided nanoparticle levitation to the liquid surface, forming a monolayer that was preserved in the serial dilutions, so altering the real calculation of the diluted material [8].

This could explain why not only 'low potency' homeopathic remedies but even highest dilutions may contain molecules with yet potentially adverse effects for the organism. As previously suggested [3], further insights are needed to highlight this issue.

Competing Interests

The author has completed the Unified Competing Interest form at http://www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declares that he had no support from any organization for the submitted work, no financial relationships with any organizations that might have an interest in the submitted work in the previous 3 years and no other relationships or activities that could appear to have influenced the submitted work.

REFERENCES

- 1 Csupor D, Boros K, Hohmann J. Low potency homeopathic remedies and allopathic herbal medicines: is there an overlap? *PLoS ONE* 2013; 8: e74181.
- 2 Jütte R, Riley D. A review of the use and role of low potencies in homeopathy. *Complement Ther Med* 2005; 13: 291–6.
- 3 Chirumbolo S. Homeopathy is not pharmacology. *J Intern Med* 2013. doi: 10.1111/joim.12132.
- 4 Dantas F, Rampes H. Do homeopathic medicines provoke adverse effects? A systematic review. *Br Homeopath J* 2000; 89 (Suppl. 1): S35–8.
- 5 Posadzki P, Alotaibi A, Ernst E. Adverse effects of homeopathy: a systematic review of published case reports and case series. *Int J Clin Pract* 2012; 66: 1178–88.
- 6 Chikramane PS, Suresh AK, Bellare JR, Kane SG. Extreme homeopathic dilutions retain starting materials: a nanoparticulate perspective. *Homeopathy* 2010; 99: 231–42.
- 7 Hampton MA, Donose BC, Nguyen AV. Effect of alcohol-water exchange and surface scanning on nanobubbles and the attraction between hydrophobic surfaces. *J Colloid Interface Sci* 2008; 325: 267–74.
- 8 Chikramane PS, Kalita D, Suresh AK, Kane SG, Bellare JR. Why extreme dilutions reach non-zero asymptotes: a nanoparticulate hypothesis based on froth flotation. *Langmuir* 2012; 28: 15864–75.

RECEIVED

16 September 2013

ACCEPTED

3 October 2013

ACCEPTED ARTICLE PUBLISHED ONLINE

18 October 2013

CORRESPONDENCE

Professor Salvatore Chirumbolo PhD, Department of Medicine, University of Verona, LURM Est Policliico GB Rossi, Piazzale al Scurio 10, 37134 Verona, Italy.
Tel.: +3904 5812 8456
Fax: +3904 5802 7403
E-mail: salvatore.chirumbolo@univr.it